

## SOIL SURVEY OF THE LUFKIN AREA, TEXAS.

By W. EDWARD HEARN and PARTY.

### LOCATION AND BOUNDARIES OF THE AREA.

The Lufkin area lies entirely within Angelina County, which is situated in the central-eastern part of Texas, about 150 miles distant from the Gulf of Mexico. The northern boundary of the area surveyed approaches very closely the Angelina River, which is the

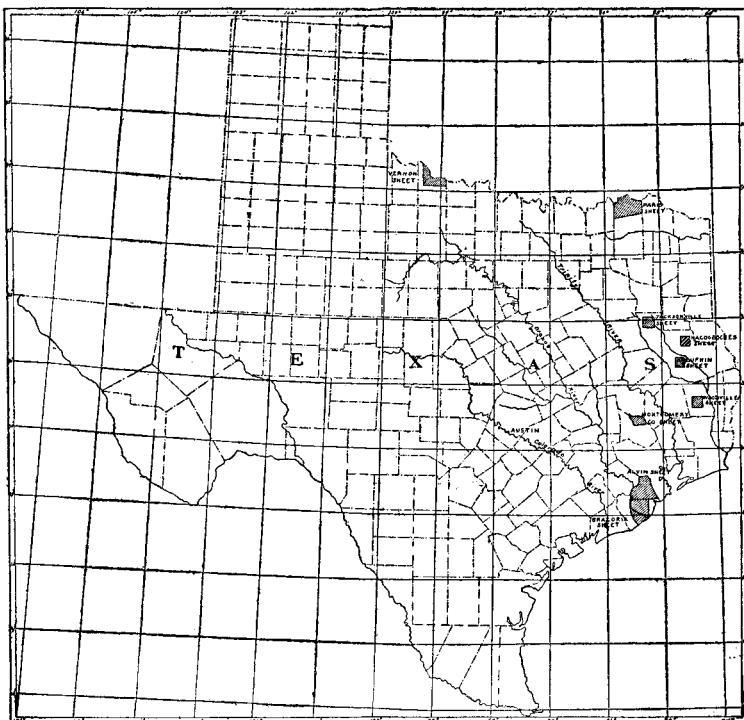


FIG. 22.—Sketch map showing location of the Lufkin area, Texas.

boundary line between Angelina and Nacogdoches counties. The area surveyed comprises approximately 100 square miles, extending 5 miles east, 5 miles west, 2 miles south, and 8 miles north from the standpipe in Lufkin. Lufkin is the county seat of Angelina County, and has a population of about 2,000.

## CLIMATE.

No Weather Bureau stations are situated within the limits of this survey, nor are there any near stations having records covering a sufficient time to have established normals. The monthly and annual average rainfall and temperature for two years given below for Trinity, situated in a county adjoining on the west, and Jasper, lying several miles southeast of the area, are the only data available.

*Monthly and annual temperature and precipitation.*

Month.	Trinity.				Jasper.			
	1901.		1902.		1901.		1902.	
	Temperature.	Precipitation.	Temperature.	Precipitation.	Temperature.	Precipitation.	Temperature.	Precipitation.
January..	54.9	1.22	48.2	1.47	56.6	1.95	48.0	1.50
February .....	51.3	6.06	50.0	2.43	54.1	4.27	.....	3.11
March .....	60.2	4.85	61.4	3.32	59.8	3.28	62.8	3.21
April.....	63.8	2.37	70.8	3.62	65.6	1.85	69.5	2.24
May.....	73.4	2.71	77.6	5.45	74.6	2.96	77.4	3.76
June .....	81.8	2.14	83.0	3.24	81.0	3.05	80.5	1.95
July.....	83.7	1.12	81.7	6.95	88.4	5.62	.....	6.46
August.....	85.1	3.03	85.4	.02	85.2	4.08	84.0	.88
September .....	76.2	2.08	77.6	6.11	77.1	2.70	76.9	3.64
October .....	68.8	.92	68.8	9.37	69.1	1.00	69.6	2.80
November .....	60.6	1.92	63.6	4.68	61.0	3.13	65.1	8.45
December.....	49.5	2.23	52.6	1.81	55.4	4.04	57.0	3.64
Year .....	67.4	30.60	68.4	48.47	68.6	37.93	.....	41.59

## PHYSIOGRAPHY AND GEOLOGY.

The general elevation of this area is about 320 feet above tide. The topography is quite simple, the country being generally level, except in the vicinity of the streams, and even there the slopes being in no case precipitous. The streams are all sluggish, and are bordered on each side by flood plains, in which they are constantly cutting new channels. In the upper reaches of the streams, however, are found small, shallow ravines, which afford fairly good drainage to a considerable part of the area.

In the immediate vicinity of Lufkin, and for some distance to the southeast and east, the surface is so level and poorly drained as to allow the land to become "crawfishy," but to the northeast, north, and northwest the relief is more pronounced, and the drainage in this part of the area is much better.

The geological formations from which most of the soils in the Lufkin area are derived belong to the Miocene period of the Tertiary era. Other and later deposits are found scattered here and there over the area. These have been laid down by erosive agencies, and belong, in all probability, to the Lafayette sands of the Pleistocene period. These later deposits consist of a coarse gray sand, occasionally as

much as 3 feet in depth, and usually containing considerable quantities of silicified wood.

The greater part of the deposits in the Lufkin area consist of gray, white, and blue sands, grading from medium to fine in texture, sometimes laminated and cross-bedded, although the greater proportion of them show no structure at all. They are frequently saline, and in dry weather, when the water has evaporated from the pools, heavy incrustations of salt are found. In many places the deposits contain quantities of silicified wood, forming a strong contrast to the beautifully opalized wood of the succeeding deposits. Quantities of siliceous pebbles occur, at some places in small patches and at others in thin, distinctly formed lines. These pebbles are mostly rounded and water-worn, but are occasionally fragmental or angular pieces of an older rounded boulder. Although they are mostly of quartz or silicified wood, occasionally pieces of syenitic rocks have been found scattered through the mass, and many have a thinly stratified or laminated structure and the appearance of a dark-blue or black slate.

The principal bed underlying these sands, and the one probably forming the greater proportion of the whole group, is a heavy bed of dark-blue clay changing to a dirty yellow, which contains clusters of small crystals of gypsum in great profusion. A little over 1 mile south of this a somewhat similar section is seen on the railroad. In this cut the gypseous clays noted in the last section are 4 feet thick and dip  $10^{\circ}$  south and  $5^{\circ}$  west, and the overlying material is made up chiefly of ferruginous gravel and sand. From this point southward through the town of Lufkin and as far south as Burke the country is flat and covered with white sand containing occasional small pockets of siliceous gravel, fossil wood, and nodules of calcareous material.

From the records of the few wells dug or bored in this region the area is thought to be underlain by a blue gypseous clay with occasional streaks or pieces of lignite. The water found is saline or alkaline and is unfit for domestic use. The lignite generally occurs in the form of rounded nodules.

#### SOILS.

Five distinct soil types, ranging in texture from a fine sand to a stiff clay, were found in the area surveyed. The following table shows the proportional and actual extent of each:

*Areas of different soils.*

Soil.	Acres.	Percent.
Lufkin fine sand .....	39,680	62.6
Lufkin clay .....	6,976	11.0
Orangeburg fine sandy loam.....	6,400	10.1
Norfolk fine sandy loam.....	6,016	9.5
Meadow.....	4,288	6.8
Total.....	63,360	-----

## LUFKIN FINE SAND.

The Lufkin fine sand consists of a gray fine sand with an average depth of 10 inches, resting on a material of much the same character to a depth of 36 inches. In a few cases the subsoil is rather more loamy than the typical section. At from 3 to 5 feet occurs a gray or mottled stratified clay. Occasionally a few pieces of quartz gravel are seen on the surface, and pieces of petrified wood are frequently found.

There are some areas of this type which differ slightly from the typical soil. In the northern part of the area the sand is underlain at a depth of from 24 to 30 inches by a yellow sandy loam. Most of this area is as yet undeveloped. There is another phase which consists of a fine, compact dark-colored sand rather silty in appearance. It occurs in very small areas occupying level or depressed places, and is locally called "crawfish land" or "prairie." This phase is developed to the largest extent in and around Lufkin.

The Lufkin fine sand is the most important soil type in the area surveyed, both in respect to extent and agricultural value. It is found in broad, extended areas over the entire area surveyed, but is most typically developed in the southern half of the sheet, where it is found in a body unbroken save by small patches of Norfolk fine sandy loam and Lufkin clay.

The surface of the Lufkin fine sand is uniformly level or gently rolling, lying usually at an elevation of from 250 to 350 feet above sea level. The small streams in this type meander through very shallow channels. The surface drainage is for the most part fairly good. The level or depressed areas, however, need draining, and would be considerably benefited even by open-ditch drains. When drained these low places will become warmer and suited to the production of late truck crops.

The Lufkin fine sand is probably derived from the weathering of sand beds of the Lafayette formation, which in this area is characterized by the presence of gravel, stratified beds of mottled clay and sand, and the presence of large quantities of petrified wood. Only a small proportion of this soil is under cultivation, and the greater part is covered with a rather dense growth of scrubby pine and oak, about all the marketable timber having been cut. The part that is tilled, however, produces medium yields of corn and cotton, the principal crops grown. The secondary crops are tomatoes, potatoes, and peaches.

The Lufkin fine sand is a very easily tilled soil and one which responds freely to fertilizers. It could be greatly improved by plowing under some leguminous crop to supply the soil with larger amounts of nitrogen.

The more rolling areas of this type might well be used to grow peaches, while the heavier phases would probably grow good apples and pears. The typical areas of this soil are adapted to late truck, small fruits, and garden vegetables.

This land is selling for from \$2.50 to \$10 per acre, and is gradually increasing in value.

Below are given the results of mechanical analyses of the fine earth of typical samples of the Lufkin fine sand:

*Mechanical analyses of Lufkin fine sand.*

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.		Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
				P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
8376	4 miles SW. of Lufkin.	Dark-gray fine sand, 0 to 10 inches.	0.64	0.00	0.48	3.46	20.82	25.04	47.82	2.32	
8374	4 miles E., 7 miles N. of Lufkin.	Gray fine sand, 0 to 10 inches.	.46	.12	.16	.88	25.86	39.80	29.64	3.54	
8378	2½ miles E., ½ mile S. of Lufkin.	Dark-gray fine sand, 0 to 10 inches.	.57	.00	.20	1.16	25.76	35.26	33.24	4.14	
8379	Subsoil of 8378.....	Dark-gray fine sand, 10 to 36 inches.	.63	.00	.12	1.16	27.52	34.34	33.02	3.84	
8377	Subsoil of 8376.....	Gray fine sand, 10 to 36 inches.	.41	.00	.52	3.46	19.60	25.62	45.44	5.36	
8375	Subsoil of 8374.....	Yellow fine loamy sand, 10 to 30 inches.	.28	.02	.20	.76	25.26	34.70	30.16	8.90	

#### ORANGEBURG FINE SANDY LOAM.

The surface soil of the Orangeburg fine sandy loam consists of a reddish or gray sandy loam of medium texture and from 8 to 20 inches deep, usually containing from 3 to 15 per cent of small iron concretions. In some localities where the surface soil does not exceed 8 or 10 inches in depth, this soil is frequently a red loam. The characteristic iron nodules are found here also, but these spots are small and always occur in typical areas of the sandy loam. The Orangeburg fine sandy loam in this area is locally known as "red land," probably on account of the outcropping red subsoil. This subsoil to a depth of 36 inches is a rather stiff, though friable, red sandy clay or clay loam. It occasionally contains a few iron concretions.

This type is confined to the northern half of the area surveyed, the largest bodies occurring in the north-central and northwestern parts of the area, while a few smaller bodies are found in the northeastern portion.

The Orangeburg fine sandy loam has similar surface features throughout. It occupies the high rolling ridges and knolls and has an elevation of about 350 feet above sea level. The drainage of this soil is very good, the surface being sufficiently rolling to carry off any excessive rainfall, while the sandy and friable character of the subsoil allows the water to drain out thoroughly.

The Orangeburg fine sandy loam is probably derived in part from a marine deposit and in part from a superimposed beach sand. Since the deposition of the latter it has undergone many changes through weathering, which has been extreme, and erosion—an important factor in the formation of this soil.

A larger proportion of this soil is under cultivation than of any other type in the area, and yet this is only partially developed. Corn and cotton are the principal crops grown. These give fairly good yields—corn from 15 to 25 bushels and cotton from one-half to two-thirds of a bale per acre. Some potatoes are grown and satisfactory yields are reported. Peaches do well on the more rolling areas, where the water and air drainage are both good. This soil is rightly considered the strongest soil in the area for general farming purposes. It is supposed to be adapted to the growing of Cuban filler and wrapper leaf tobacco.

Below are given mechanical analyses of typical samples of the Orangeburg fine sandy loam:

*Mechanical analyses of Orangeburg fine sandy loam.*

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.		Coarse sand, 1 to 0.5 mm.		Medium sand, 0.5 to 0.25 mm.		Fine sand, 0.25 to 0.1 mm.		Very fine sand, 0.1 to 0.05 mm.		Silt, 0.05 to 0.005 mm.		Clay, 0.005 to 0.0001 mm.	
				P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	
8367	6 miles N., 4½ miles W. of Lufkin.	Red, medium, sandy loam, 0 to 12 inches.	0.80	2.10	4.48	9.60	44.56	16.70	14.22	8.34							
8369	5 miles N. of Lufkin.	Brown, medium, sandy loam, 0 to 14 inches.	.88	2.44	1.62	1.38	33.26	27.44	21.84	12.00							
8368	Subsoil of 8367.....	Red, sticky, sandy clay, 12 to 36 inches.	.92	.86	2.64	6.10	33.60	10.32	15.90	30.54							
8370	Subsoil of 8369.....	Red, sandy clay loam, 14 to 36 inches.	.71	.88	1.20	.90	16.64	11.18	17.54	51.66							

#### NORFOLK FINE SANDY LOAM.

The Norfolk fine sandy loam is a whitish or gray medium sand, having an average depth of 22 inches, although in many places reaching to a

depth of 3 feet or more. The subsoil is a yellowish sandy clay, slightly sticky, extending in the typical section from 22 to 36 inches below the surface. The areas of the deeper sandy phase are scattered here and there over the area, and it was found impracticable on a map of the present scale to make a separation of the two phases. The surface soil occasionally contains some quartz gravel.

The Norfolk fine sandy loam is found to the largest extent in the central-western part of the area surveyed and in smaller areas in other parts of the area. It usually occupies knolls and ridges and has an elevation of several feet above the surrounding soil formations. Its surface is uniformly rolling, and the drainage is excellent. The surface water runs off readily, while the porous nature of the soil permits a free circulation of the ground water. So thorough is the drainage that the soil can be tilled almost immediately after a rain.

The Norfolk fine sandy loam was originally a beach sand and probably owes its origin to the weathering of the sand beds of the Lafayette formation. It represents a part of the most recent formation in the area and has not yet undergone very great comminution by the forces of weathering.

A few fields of this soil are under cultivation and give fairly good yields of truck, but only moderate yields of corn and cotton. Of the truck crops, tomatoes are grown with good results. In some localities a few peach trees are found, which seem to be in good condition.

The Norfolk fine sandy loam is best adapted to truck and small fruits and peaches. It will doubtless be found to be a good soil for alfalfa, where well drained and deep. It is easily tilled, but lacks organic matter, and has to be heavily fertilized to give good results. It could be much improved by green manuring crops.

The following table gives mechanical analyses of typical samples of the soil and subsoil:

*Mechanical analyses of Norfolk fine sandy loam.*

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.001 mm.
8371	3 miles NW. of Lufkin.	Whitish medium sand, 0 to 36 inches	P. ct. 0.30	P. ct. 0.00	P. ct. 0.92	P. ct. 10.80	P. ct. 54.16	P. ct. 19.08	P. ct. 13.30	P. ct. 1.60
8372	4 miles W., $2\frac{1}{2}$ miles N. of Lufkin.	Gray medium to coarse sand, 0 to 22 inches.	.50	.08	.88	9.60	56.62	13.34	14.96	4.36
8373	Subsoil of 8372.....	Mottled impervious sandy clay, 22 to 36 inches.	.50	.00	.40	4.22	26.24	6.72	7.94	54.44

## LUFKIN CLAY.

The Lufkin clay consists of a fine sandy or silty loam from 3 to 8 inches deep, containing in some localities a few iron concretions, resting on a subsoil of stiff, impervious red clay. This material grades into a plastic and mottled clay at a depth of about 30 inches. Below 3 or 5 feet the clay becomes distinctly stratified. There are small areas of this soil which are a medium sand from 6 to 8 inches deep. Such spots usually occur as knolls and eroded areas in the Lufkin fine sand.

The most extensive development of this soil is found in the northern part of the area surveyed, where it occurs in two large bodies. Smaller areas, however, are scattered over the survey, a number being grouped around Lufkin.

The surface of the Lufkin clay is generally level or gently rolling, but some small spots and the portions adjoining the streams are more rolling and often steep. The drainage is poor over the largest areas, owing to the level character of the country and the impervious nature of the subsoil. The more rolling places have good surface drainage.

The Lufkin clay, it is believed, is derived from a lacustrine deposit, more or less modified by erosion and weathering.

This soil type is for the most part unimproved. It is a poor, light soil, and yet is hard to till on account of the sticky nature of the subsoil. It is covered with a forest of scrubby pine in which occur a few stunted oaks. Originally the soil supported forests of merchantable pine timber, but these have all been cut off. There are a few cultivated fields, however, which are planted to cotton and corn. This soil is not adapted to ordinary farm crops. It might grow good apples and pears, and if properly seeded would make good pasturage.

Below are given the results of mechanical analyses of typical samples of the soil and subsoil of the Lufkin clay:

*Mechanical analyses of Lufkin clay.*

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
8363	6 miles N., 3 miles E. of Lufkin.	Brown silty loam, 0 to 6 inches.	P. ct. 2.30	P. ct. 1.60	P. ct. 2.02	P. ct. 1.04	P. ct. 7.10	P. ct. 22.82	P. ct. 48.36	P. ct. 17.00
8364	Subsoil of 8363.....	Mottled, sticky impervious clay, 6 to 36 inches.	.58	1.24	1.34	.40	3.80	11.54	27.68	53.94

## MEADOW.

The Meadow soil found in this area usually consists of a silty loam with a depth of 3 feet or more. The only large bodies are found in the northern part of the area surveyed, along Mill Creek and near the mouth of Priscilla Creek. Some narrow strips are seen along the smaller streams, but here the soil is generally a fine sand quite similar to the adjoining soil formations.

This type of soil occupies the low, level, flat lands and has scarcely any drainage. The large areas of Meadow are partly the result of flood water backing from the Angelina River, which runs within a half mile of the northern boundary of the area. All the Meadow land is subject to several overflows each year. It can not be drained by gravity, and its reclamation for agricultural purposes would be difficult and expensive.

There is a very heavy growth of sweet gum, black gum, hickory, and several varieties of oak on this soil. The gum trees could be used in the manufacture of veneer, while a spoke and handle factory could make profitable use of the oak and hickory, but the supply is comparatively limited and the industry could only be established temporarily.

No samples of this soil were collected for analysis, as the classification is based on position and drainage conditions, and not on textural characteristics.

## AGRICULTURAL CONDITIONS.

The farming class in the Lufkin area is not, generally speaking, in a prosperous condition. The greater number of the farmers appear to be barely making a living, and only occasionally is one found who is saving money and improving his farm. Small frame or log houses with a poor barn or shed are, as a rule, all the improvements to be seen on the farm. There are a few energetic men who have neat, painted frame houses, with well-kept grounds, showing what can be done.

One great drawback in the past has been the attempt to cultivate too much land, and another, the lack of proper methods of cultivation. Land has been so cheap and plentiful that when one field ceases to produce satisfactorily a new field is cleared and put under cultivation. Another serious hindrance to successful farming in this section is the credit system. In the greater number of cases the crops are mortgaged in the spring, and at the end of the year the merchant frequently secures all the profit of the season's work, and even then the farmer is sometimes in debt to him. One other serious drawback to the material advancement of the farming class is the fact that they buy a great deal of the hay and grain that is fed to their stock. This practice should be changed and all feed for stock should be grown on the farm.

About 10 per cent of the land in this area is cultivated. The greater proportion is covered with a dense growth of scrubby pine and oak. About all the original heavy pine timber, which was marketable, has been cut off, the existing forests being a second growth.

The greater number of the farms of the area are owned and operated by the farmers themselves. Most of the remainder are rented on shares and only a few for money. The owner usually receives for the use of the land one-third of the cotton and one-fourth of the corn.

Labor is scarce throughout the area and what there is asks a high wage, due to the great demand for help at the three large sawmills operating in the area. These mills employ a large number of day laborers and pay them a higher wage than the farmer can afford to give.

Corn and cotton are the principal crops, while tomatoes, potatoes, and garden vegetables are secondary products. A few peach trees have been set out. It is generally recognized that the Norfolk fine sandy loam and Lufkin fine sand are better adapted to truck and fruit, while the Orangeburg fine sandy loam is a stronger soil and gives the largest yields of corn and cotton. The Meadow land, if it could be protected from overflow, would probably grow sugar cane.

The transportation facilities in this area are remarkably good for a country no further advanced in an agricultural way. The Houston, East and West Texas Railway passes through the area in a north and south direction. Lufkin is also entered by the St. Louis Southwestern system, which has a direct line to St. Louis, and connects at Huntington with the Southern Pacific Railway. The Eastern Texas Railroad also comes into Lufkin.

The dirt roads of the area are not very good, and could be considerably improved by a small expenditure of money.

Lufkin affords some market for the truck and small fruits grown in the area.

Land in this area is exceedingly cheap. Good truck land, of which there are thousands of acres, may be bought for from \$2.50 to \$12 an acre, according to location and distance from Lufkin. In recent years, or since the farmers began to grow truck, this land has increased considerably in value.

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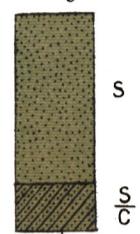
U.S. DEPT. OF AGRICULTURE  
BUREAU OF SOILS  
MILTON WHITNEY, CHIEF.

# SOIL MAP

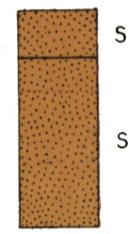
TEXAS  
LUFKIN SHEET

## SOIL PROFILE (3 feet deep)

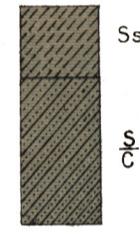
Norfolk fine sandy loam



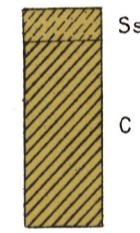
Lufkin fine sand



Orangeburg fine sandy loam



Lufkin clay



Meadow



## LEGEND

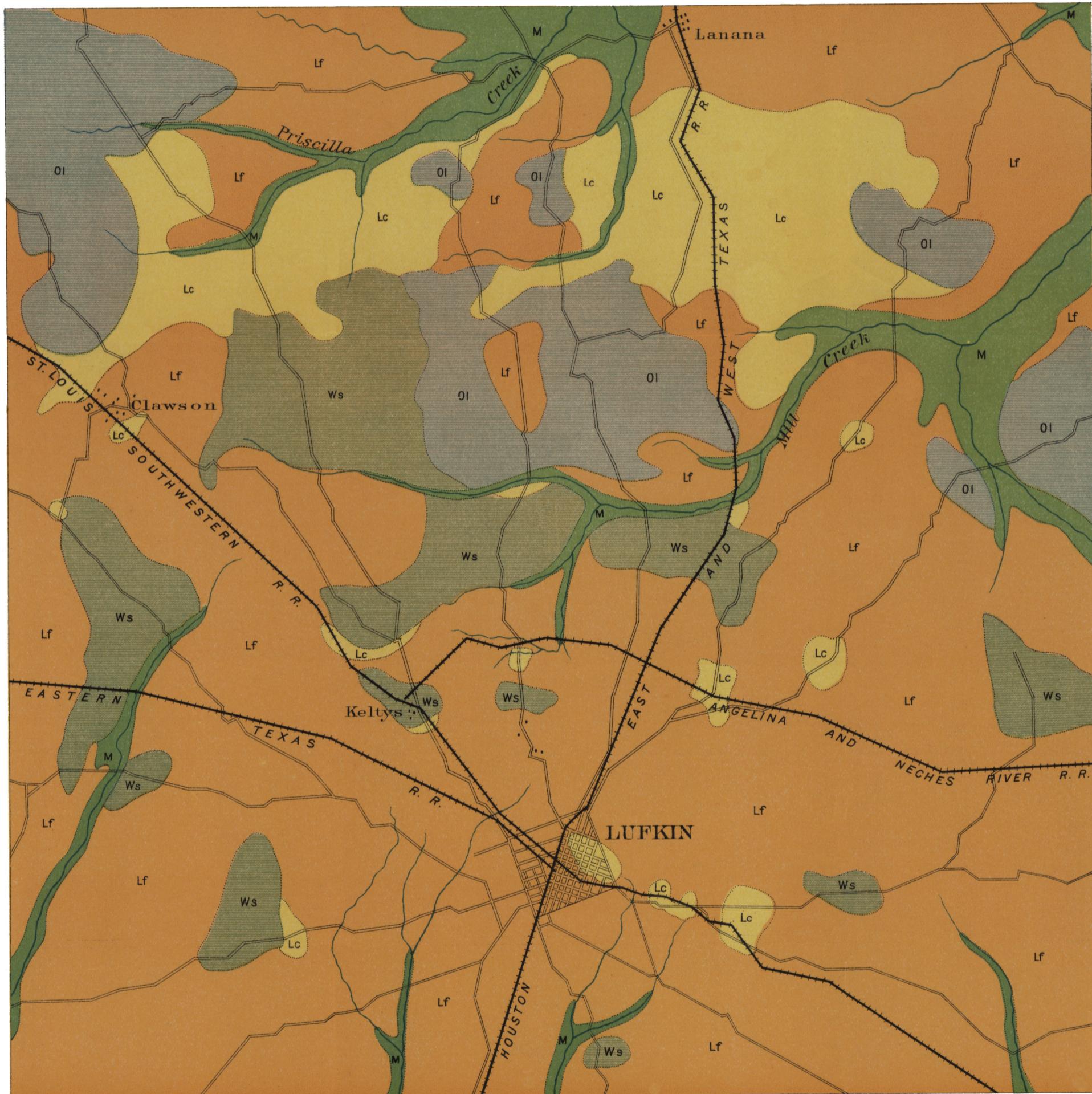
S Sand

S Sandy clay

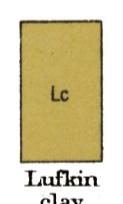
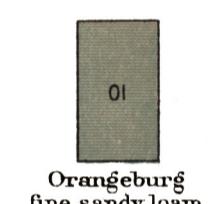
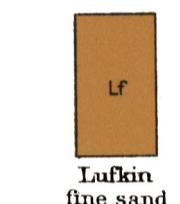
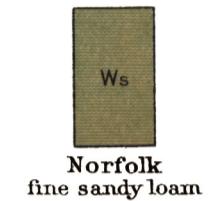
Ssc Sandy loam

C Clay

Sic Silt loam



## LEGEND



Soils Surveyed by  
W. Edward Hearn and  
James L. Burgess  
1903

A. Hoern & Co. Lith. Baltimore, Md.

Field Operations  
Bureau of Soils  
1903.

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Scale 1 inch = 1 mile